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Thangella

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(54) **ENABLING AN INPUT DEVICE SIMULTANEOUSLY WITH MULTIPLE ELECTRONIC DEVICES**

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USPC 455/41.2; 345/2.3, 156, 157, 163; 726/19

See application file for complete search history.

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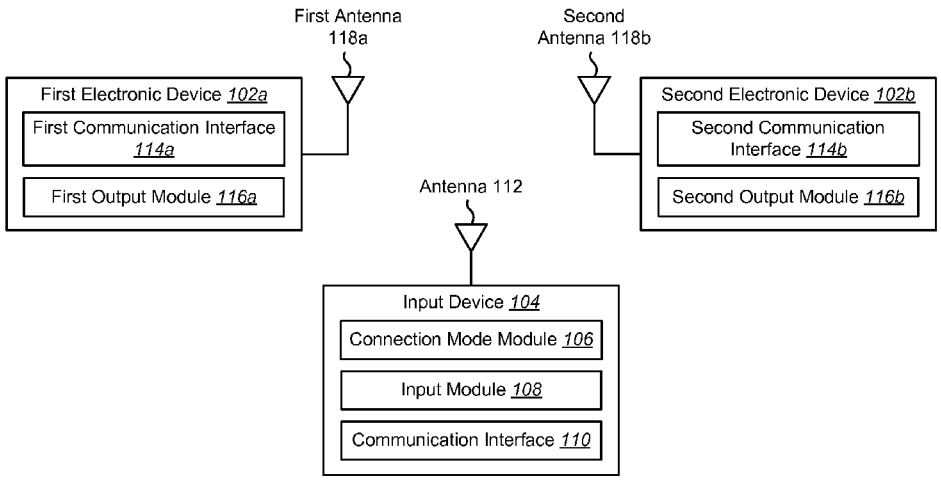
(57) **ABSTRACT**

A method for using an input device simultaneously with multiple electronic devices is described. A first connection is established with a first electronic device. The first connection enters an active mode. A second connection is established with a second electronic device. The second connection enters the active mode. The first connection switches to a standby mode in response to the second connection entering the active mode. The first connection and the second connection switch between the active mode and the standby mode, where only one connection is in the active mode at a time.

47 Claims, 8 Drawing Sheets



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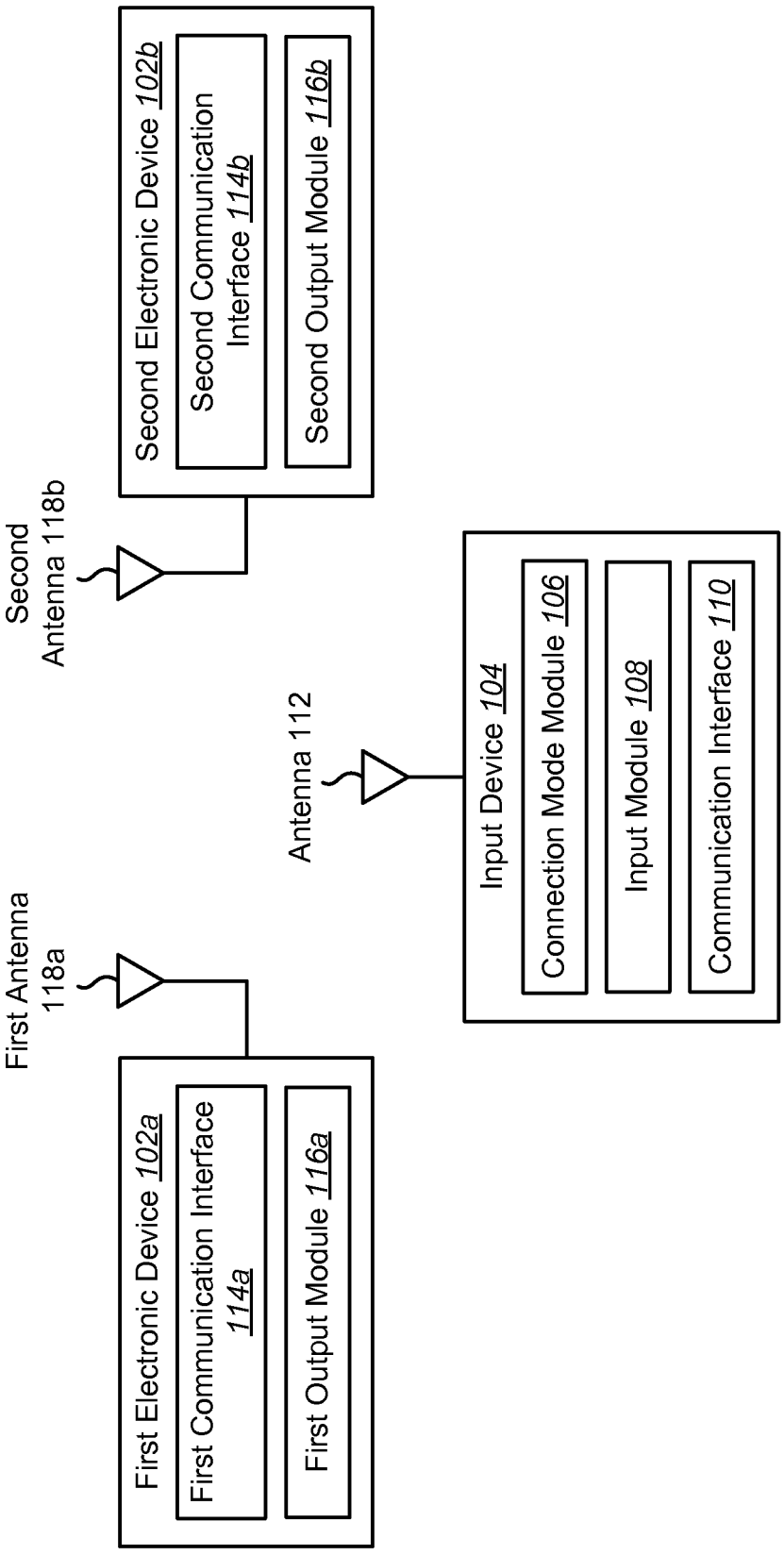
Second Electronic Device 102b
Second Communication Interface 114b
Second Output Module 116b
Second Antenna 118b
Antenna 112
Input Device 104
Connection Mode Module 106
Input Module 108
Communication Interface 110
First Antenna 118a
First Electronic Device 102a
First Communication Interface 114a
First Output Module 116a

FIG. 1

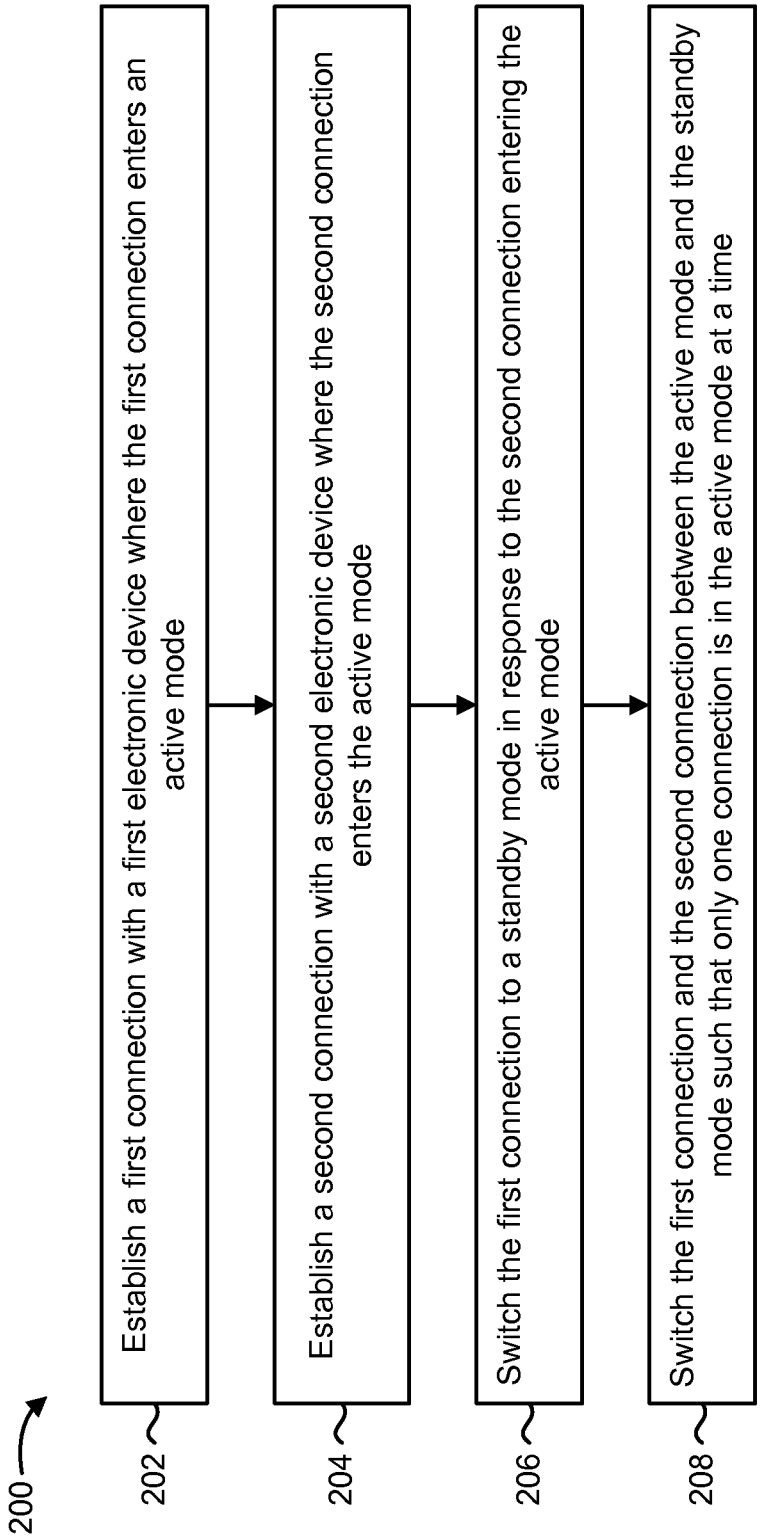
200
202
Establish a first connection with a first electronic device where the first connection enters an active mode
204
Establish a second connection with a second electronic device where the second connection enters the active mode
206
Switch the first connection to a standby mode in response to the second connection entering the active mode
208
Switch the first connection and the second connection between the active mode and the standby mode such that only one connection is in the active mode at a time

FIG. 2

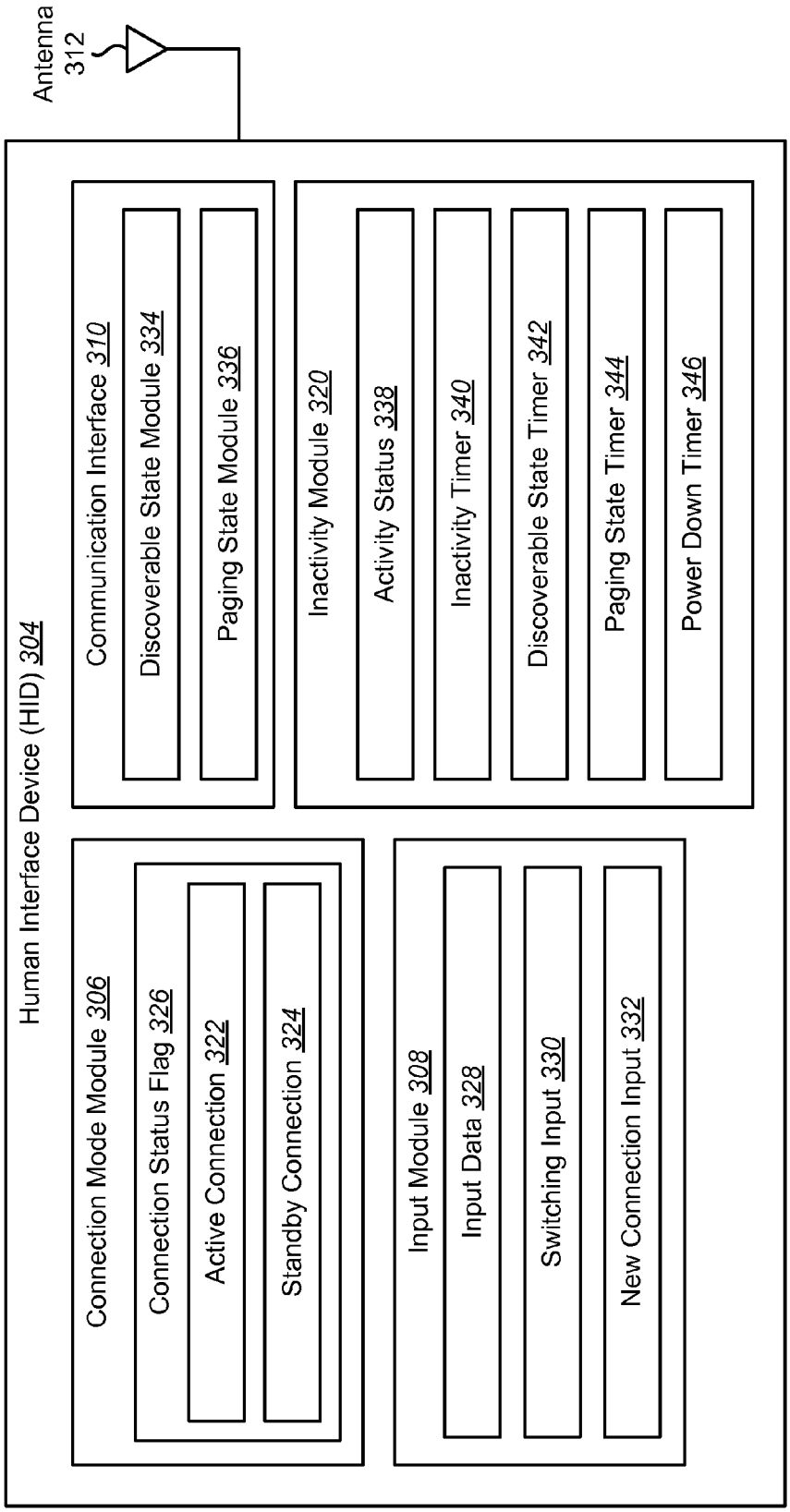
Antenna
312
Human Interface Device (HID) 304
Communication Interface 310
Discoverable State Module 334
Paging State Module 336
Inactivity Module 320
Activity Status 338
Inactivity Timer 340
Discoverable State Timer 342
Paging State Timer 344
Power Down Timer 346
Connection Mode Module 306
Connection Status Flag 326
Active Connection 322
Standby Connection 324
Input Module 308
Input Data 328
Switching Input 330
New Connection Input 332

FIG. 3

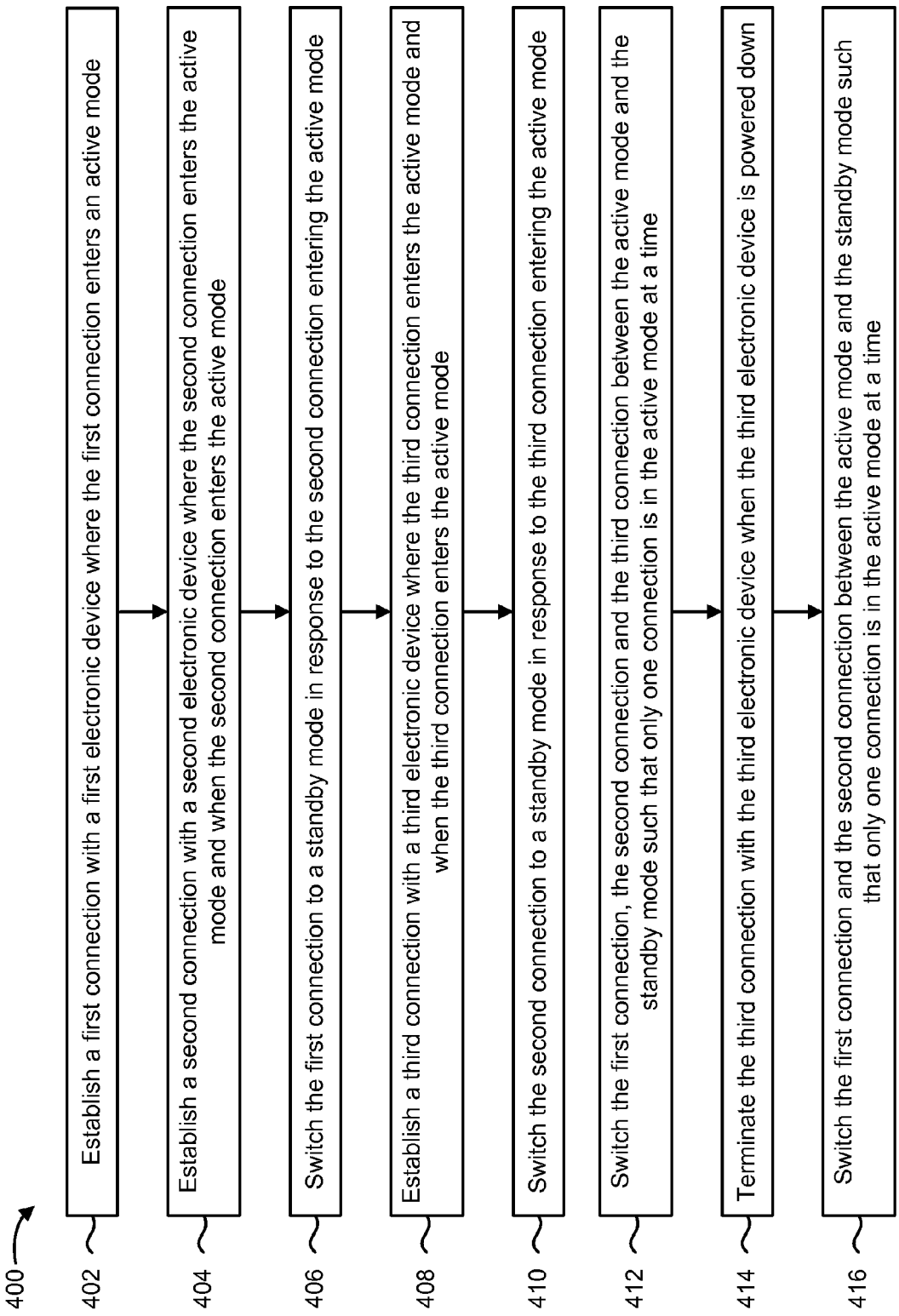
400
402
Establish a first connection with a first electronic device where the first connection enters an active mode
404
Establish a second connection with a second electronic device where the second connection enters the active mode and when the second connection enters the active mode
406
Switch the first connection to a standby mode in response to the second connection entering the active mode
408
Establish a third connection with a third electronic device where the third connection enters the active mode and when the third connection enters the active mode
410
Switch the second connection to a standby mode in response to the third connection entering the active mode
412
Switch the first connection, the second connection and the third connection between the active mode and the standby mode such that only one connection is in the active mode at a time
414
Terminate the third connection with the third electronic device when the third electronic device is powered down
416
Switch the first connection and the second connection between the active mode and the standby mode such that only one connection is in the active mode at a time

FIG. 4

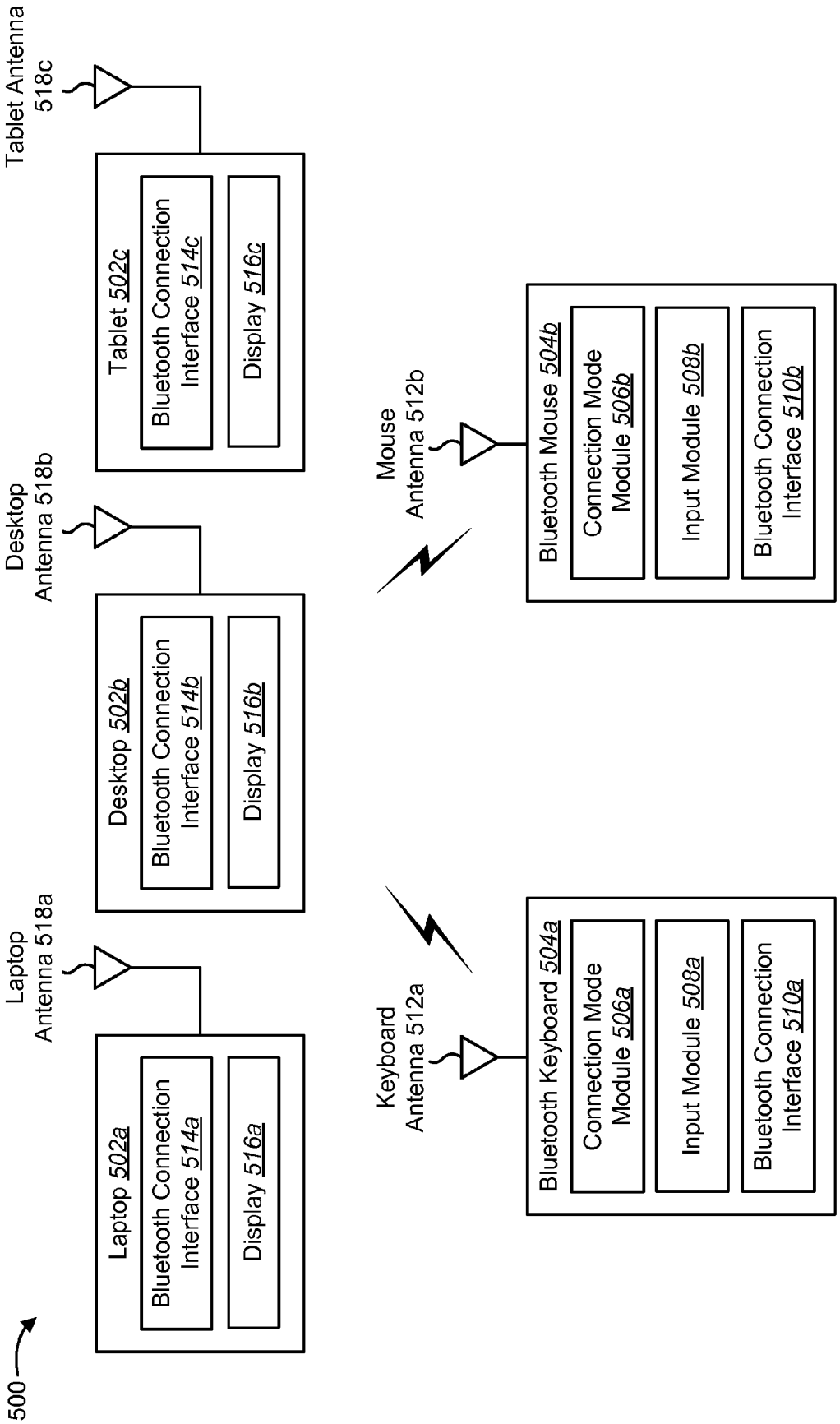
500
Laptop Antenna 518a
Laptop 502a
Bluetooth Connection Interface 514a
Display 516a
Desktop Antenna 518b
Desktop 502b
Bluetooth Connection Interface 514b
Display 516b
Tablet Antenna 518c
Tablet 502c
Bluetooth Connection Interface 514c
Display 516c
Keyboard Antenna 512a
Bluetooth Keyboard 504a
Connection Mode Module 506a
Input Module 508a
Bluetooth Connection Interface 510a
Mouse Antenna 512b
Bluetooth Mouse 504b
Connection Mode Module 506b
Input Module 508b
Bluetooth Connection Interface 510b

FIG. 5

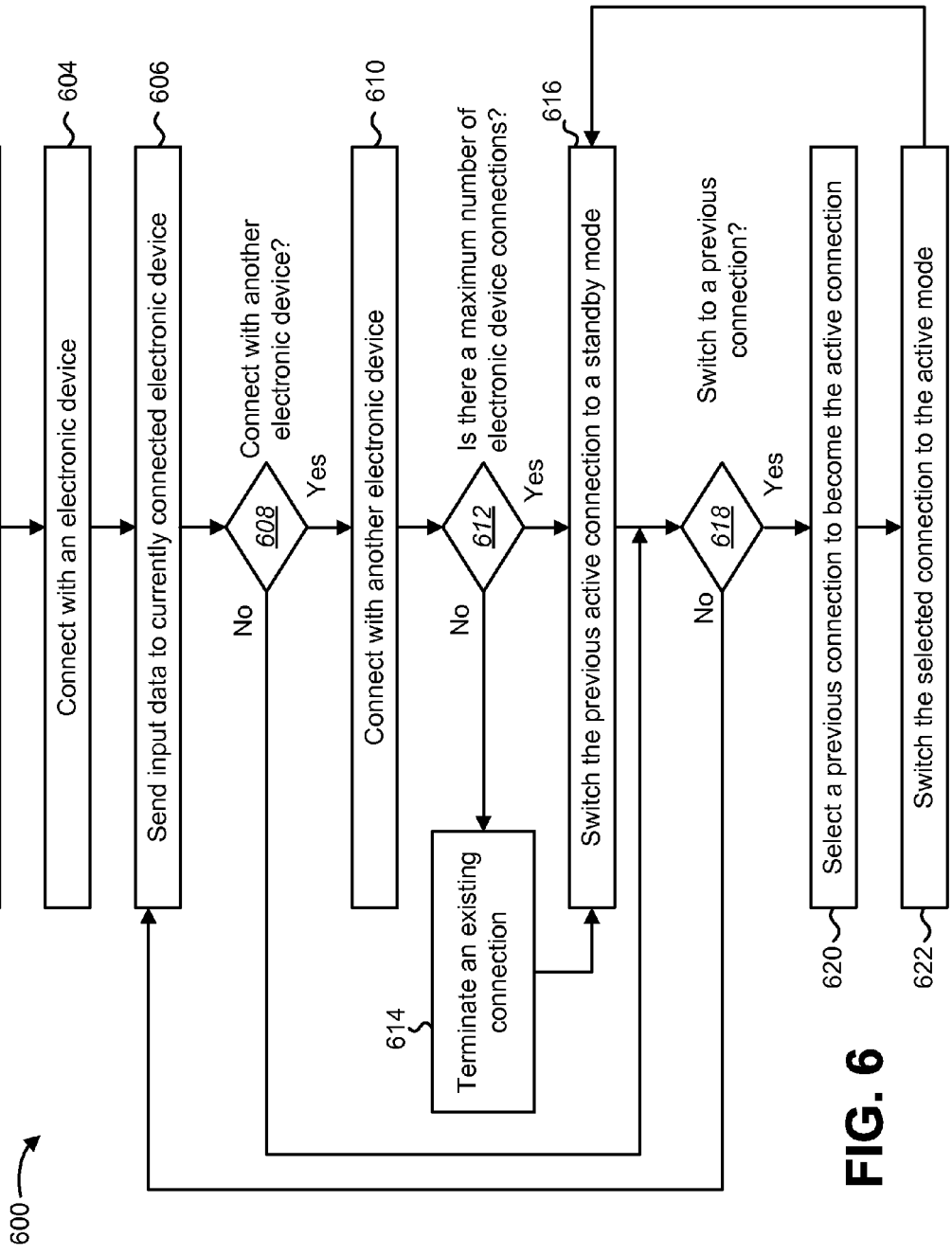
600
602
Power on input device
604
Connect with an electronic device
606
Send input data to currently connected electronic device
608
Connect with another electronic device?
Yes
No
610
Connect with another electronic device
612
Is there a maximum number of electronic device connections?
Yes
No
614
Terminate an existing connection
616
Switch the previous active connection to a standby mode
618
Switch to a previous connection?
Yes
No
620
Select a previous connection to become the active connection
622
Switch the selected connection to the active mode

FIG. 6

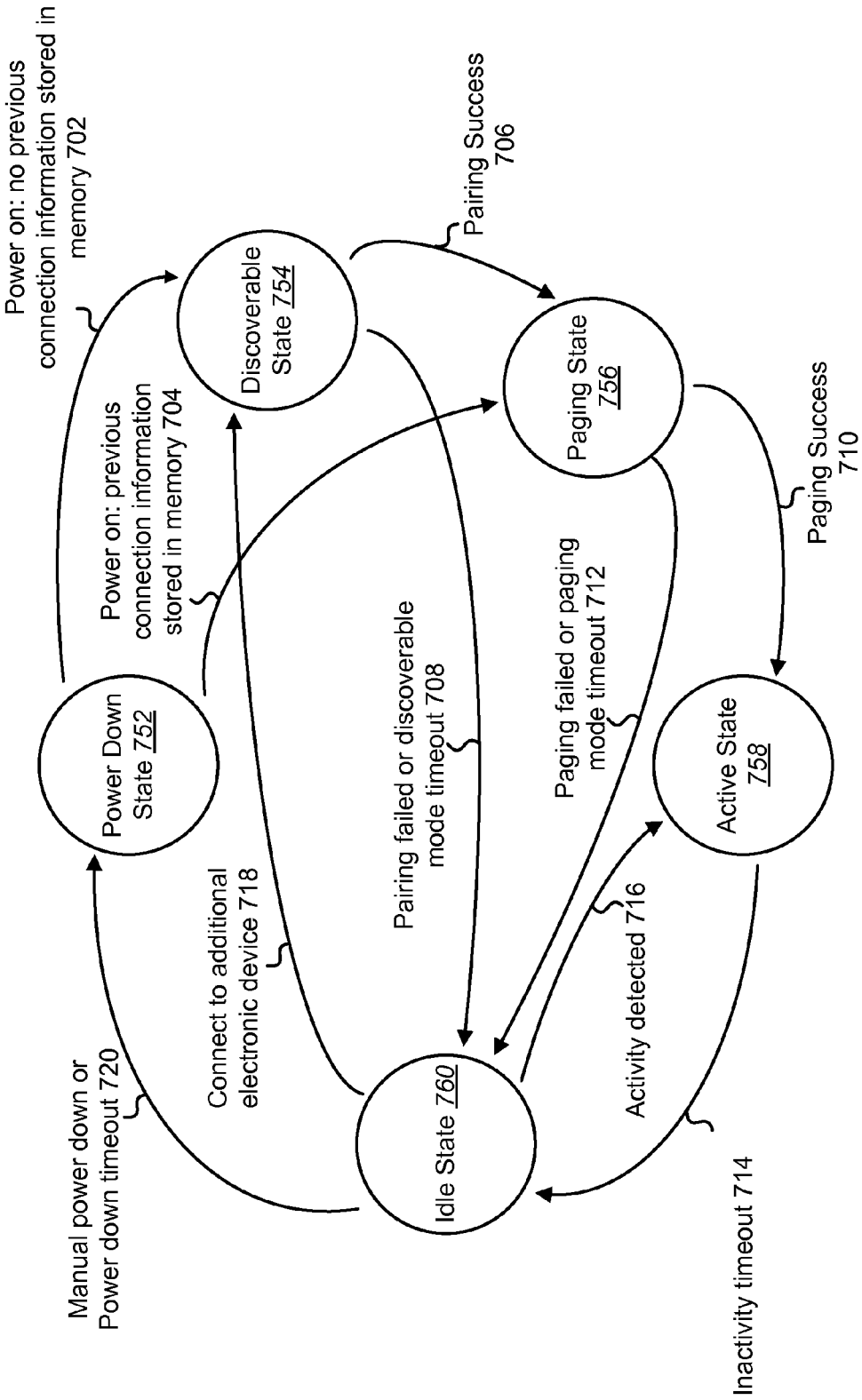
Power on: no previous connection information stored in memory 702
Discoverable State 754
Pairing Success 706
Paging State 756
Power on: previous connection information stored in memory 704
Paging Success 710
Power Down State 752
Pairing failed or discoverable mode timeout 708
Paging failed or paging mode timeout 712
Active State 758
Connect to additional electronic device 718
Activity detected 716
Idle State 760
Manual power down or Power down timeout 720
Inactivity timeout 714

FIG. 7

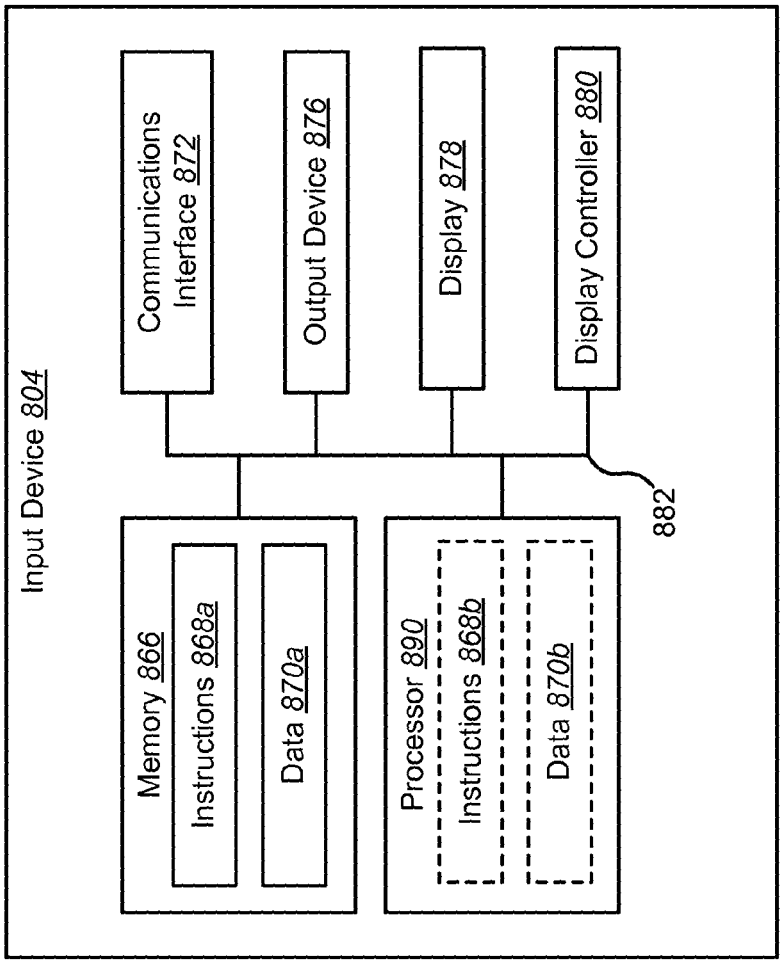
Input Device 804
Communications Interface 872
Output Device 876
Display 878
Display Controller 880
882
Memory 866
Instructions 868a
Data 870a
Processor 890
Instructions 868b
Data 870b

FIG. 8

ENABLING AN INPUT DEVICE SIMULTANEOUSLY WITH MULTIPLE ELECTRONIC DEVICES

TECHNICAL FIELD

The present disclosure relates generally to electronic devices. More specifically, the present disclosure relates to electronic input devices.

BACKGROUND

In the last several decades, the use of electronics has become common. In particular, advances in electronic technology have reduced the cost of increasingly complex and useful electronic devices. Cost reduction and consumer demand have proliferated the use of electronic devices such that they are practically ubiquitous in modern society. As the use of electronic devices has expanded, so has the demand for new and improved features of electronics. More specifically, electronic devices that perform new functions or that perform functions faster, more efficiently or with higher quality are often sought after.

Some electronic devices may connect with other electronic devices, such as input devices. For instance, some electronic devices use input devices to capture user data. Some examples of input devices include a keyboard, mouse, microphone, remote control device, button, joystick, trackball, touchpad, lightpen, etc. Improvement of how input devices connect with multiple electronic devices may be beneficial.

SUMMARY

A method for using an input device simultaneously with multiple electronic devices is described. A first connection is established with a first electronic device. The first connection enters an active mode. A second connection is established with a second electronic device. The second connection enters the active mode. The first connection switches to a standby mode in response to the second connection entering the active mode. The first connection and the second connection switch between the active mode and the standby mode, where only one connection is in the active mode at a time.

The input device may send input data to the electronic device that is connected in the active mode. Connection mode information corresponding to the first connection and connection mode information corresponding to the second connection may be stored when the input device is powered down. The connection mode of the first connection may be restored using the connection mode information corresponding to the first connection. The connection mode of the second connection may be restored using the connection mode information corresponding to the second connection.

The input device may be a Bluetooth input device. Switching the first connection and the second connection between the active mode and the standby mode may be triggered by selecting a single input on the input device.

A third connection may be established with a third electronic device. The third connection may enter the active mode. The first connection and the second connection may switch to a standby mode in response to the third connection entering the active mode. The first connection, the second connection, and the third connection may switch between the active mode and the standby mode, where only one connection may be in the active mode at a time. Switching the first connection, the second connection and the third connection between the active mode and the standby mode may be triggered by selecting a single input on the input device. Repeatedly selecting the single input may cycle the input device through the first connection, the second connection, and the third connection.

A maximum number of connections may be established. An oldest connection may be terminated when an additional connection is added or the connection that has not been in the active mode for the longest amount of time may be terminated when an additional connection is added.

A first connection status flag may correspond to the first connection and a second connection status flag may correspond to the second connection. Each connection status flag may indicate if the corresponding connection is in the active mode or the standby mode. Upon switching the first connection and the second connection between the active mode and the standby mode, each connection status flag may be updated.

Input data obtained on the input device may buffer while the first connection and the second connection switch between the active mode and the standby mode. The buffered input data may be transmitted after the switch is completed.

A transition from a power down state to a discoverable state may occur when no connection mode information is stored on the input device. A transition from the power down state to a paging state may occur when connection mode information is stored on the input device. A transition from a discoverable state to a paging state may occur when the input device successfully pairs with the electronic device that is trying to enter into the active mode with the human interface device (HID) input device. A transition from a discoverable state to an idle state may occur when a discoverable state timer expires. A transition from a discoverable state to the idle state may occur when a pairing failure occurs with the electronic device that is trying to enter into the active mode with the HID input device.

A transition from a paging state to an idle state may occur when a paging failure or a paging mode timeout occurs with the electronic device that is trying to enter into the active mode with the HID input device.

A transition to the active state may occur when input data is detected. A transition from the active state to a discoverable state may occur when an input on the input device is selected. The first electronic device may be in the active mode and the first electronic device may transition from an idle state to a power down state when the first electronic device is powered down. The second connection may automatically switch from the standby mode to the active mode when the first electronic device is powered down.

The first connection with the first electronic device may be maintained in the standby mode. The input device may not send input data to the first electronic device. The second connection with the second electronic device may be maintained in the active mode. The input device may send input data to the second electronic device.

An input device configured to simultaneously communicate with multiple electronic devices is also described. The input device includes a processor and executable instructions stored in memory that are in electronic communication with the processor. The input device establishes a first connection with a first electronic device. The first connection enters an active mode. The input device also establishes a second connection with a second electronic device. The second connection enters the active mode. The input device switches the first connection to a standby mode in response to the second connection entering the active mode. The input device switches the first connection and the second connection

between the active mode and the standby mode, where only one connection is in the active mode at a time.

A computer-program product for using an input device simultaneously with multiple electronic devices is described. The computer-program product includes a non-transitory computer-readable medium having instructions thereon. The computer-program product includes instructions for causing an input device to establish a first connection with a first electronic device. The first connection enters an active mode. The computer-program product also includes instructions for causing the input device to establish a second connection with a second electronic device. The second connection enters the active mode. The computer-program product further includes instructions for causing the input device to switch the first connection to a standby mode in response to the second connection entering the active mode. The computer-program product additionally includes instructions for causing the input device to switch the first connection and the second connection between the active mode and the standby mode, where only one connection is in the active mode at a time.

An apparatus for using an input device simultaneously with multiple electronic devices is also described. The apparatus includes means for establishing a first connection with a first electronic device. The first connection enters an active mode. The apparatus also includes means for establishing a second connection with a second electronic device. The second connection enters the active mode. The apparatus further includes means for switching the first connection to a standby mode in response to the second connection entering the active mode. The apparatus additionally includes means for switching the first connection and the second connection between the active mode and the standby mode, where only one connection is in the active mode at a time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram illustrating one configuration of an input device that is enabled to simultaneously connect with multiple electronic devices;

FIG. **2** is a flow diagram illustrating one configuration of a method for using an input device simultaneously with multiple electronic devices;

FIG. **3** is a block diagram illustrating one configuration of a human interface device;

FIG. **4** is a flow diagram illustrating a more detailed configuration of a method for using an input device simultaneously with multiple electronic devices;

FIG. **5** is a diagram illustrating one configuration of a system in which one or more Bluetooth input devices may simultaneously connect with multiple electronic devices;

FIG. **6** is a flow diagram illustrating a more detailed configuration of a method for using an input device simultaneously with multiple electronic devices;

FIG. **7** is a state diagram illustrating transitions on a human interface device; and

FIG. **8** illustrates various components that may be utilized in an input device.

DETAILED DESCRIPTION

In some known configurations, an input device may only be able to connect/pair with one electronic device at a time. For example, an input device may be connected to a first electronic device, allowing the input device to send input data to the first electronic device. When the input device connects to a second electronic device to provide input data to the second electronic device, the connection between the input device and the first electronic device may be terminated.

As an example, suppose a work station has multiple electronic devices, such as a laptop computer and a desktop computer. The workstation may also include an input device, such as a wireless keyboard or a wireless mouse. The keyboard or mouse may only be able to pair to either the laptop computer or the desktop computer at one time, for example, using Bluetooth technology. In other words, the keyboard or mouse cannot connect with both the laptop computer and the desktop computer at the same time. As a result, a user desiring to use both the laptop computer and the desktop computer at the same time must employ a separate keyboard and a separate mouse for each.

If the user desires to use the same keyboard and mouse for both electronic devices, the user would need to re-pair and reconnect the keyboard and mouse to the desired electronic device. Further, each time the keyboard and/or mouse connects with the desired electronic device, the connection with the previously connected electronic device would be lost. This process may become cumbersome for a user who needs to repeatedly switch the input device to different electronic devices.

FIG. **1** is a block diagram illustrating one configuration of an input device **104** that is enabled to simultaneously connect with multiple electronic devices **102***a-b*. The input device **104** may be a keyboard, mouse, microphone, remote control device, button, joystick, trackball, touchpad, lightpen, etc., or another type of human interface device (HID). The input device **104** may enable simultaneous connections with the multiple electronic devices **102***a-b*. The first electronic device **102***a* and/or the second electronic device **102***b* may be, for example, a laptop computer, a desktop computer, a notebook computer, a cellular phone, a smart phone, a wireless modem, an e-reader, a tablet device, a gaming system, etc.

As illustrated in FIG. **1**, the input device **104** may enable simultaneous connections with the multiple electronic devices **102***a-b*. For example, the input device **104** may simultaneously maintain connections with the first electronic device **102***a* and the second electronic device **102***b*.

The first electronic device **102***a* may include a first communication interface **114***a*, a first output module **116***a* and a first antenna **118***a*. The first communication interface **114***a* may receive input data from the input device **104**. For example, input data may be received via the first antenna **118***a* and the first communication interface **114***a*.

The first communication interface **114***a* may provide input data to the first output module **116***a*. The first output module **116***a* may output the input data, for example, on a display device. Examples of display devices in the first output module **116***a* may include a liquid crystal display (LCD), light-emitting diode (LED), gas plasma, electroluminescence, or the like. Other output devices may also be employed by the first output module **116***a*.

The second electronic device **102***b* may include a second communication interface **114***b*, a second output module **116***b* and a second antenna **118***b*. The second communication interface **114***b* may receive input data from the input device **104**. For example, input data may be received via the second antenna **118***b* and the second communication interface **114***b*.

The second communication interface **114***b* may provide input data to the second output module **116***b*. The second output module **116***b* may output the input data, for example on a display device or output device.

The input device **104** may include a connection mode module **106**, an input module **108**, a communication interface **110** and an antenna **112**. The input device **104** may be con-

nected to multiple electronic devices **102***a-b* at the same time. However, the input device **104** may only send input data to one of the multiple electronic devices **102***a-b* at a time. In other words, only one of the connections may be active at a time.

The connection mode module **106** may monitor and maintain information about each connection between the input device **104** and the multiple electronic devices **102***a-b*.

In some configurations, the connection mode module **106** may set a connection status flag that corresponds to each connection with each electronic device **102**. The connection status flag may indicate if the connection is in an active mode (e.g., actively connected) or in a standby mode (e.g., connected but in a standby state). When one of the connections becomes the active connection, the connection mode module **106** may set the connection status flags on the remaining connections to standby. Thus, the connection mode module **106** may maintain which electronic device **102** the input device is actively connected to and which electronic devices **102** the input device is connected with but not receiving input data.

The electronic device **102** that receives input data may be flagged as active or in the active mode. The other multiple electronic devices **102** that are connected to the input device **104**, but that are receiving input data sent from the input device **104** may be flagged as standby, or in the standby mode.

When the input device **104** receives a notification that the active connection should switch from one electronic device **102**, such as the first electronic device **102***a*, to a second electronic device **102**, such as the second electronic device **102***b*, the connection mode module **106** may change the status of each connection status flag to correspond to the selected change. In this manner, the input device **104** may switch from sending input data from the first electronic device **102***a* to the second electronic device **102***b*. Additionally, the connection mode module **106** may change the connection status flag of the first connection to standby mode and the connection status flag of the second connection to active mode.

The connection mode module **106** may also assist the input device **104** in establishing a connection and/or pairing with an electronic device **102**. For example, the input device **104** may be paired with the first electronic device **102***a* only. Before the input device **104** can switch to communicate with the second electronic device **102***b*, the input device may need to pair with the second electronic device **102***b*. The connections mode module **106** may facilitate pairing with the second electronic device **102***b*. Once the input device **104** is paired to the second electronic device **102***b*, the connection mode module **106** may switch communications between the first electronic device **102***a* and the second electronic device **102***b*.

The input module **108** may obtain input, such as user input, indicating to the input device **104** to switch communications between electronic devices **102** or to pair with a new electronic device **102**. For example, the input module **108** may be coupled to a button or key on the input device **104** that detects user input. For instance, the input device **104** may be a Bluetooth mouse that has a button that when selected or pressed, indicates to the input device **104** to switch communications to another electronic device **102**.

In some configurations, the switch button may be briefly pressed to indicate to the input device **104** to switch the input device **104** from the first electronic device **102***a* to the second electronic device **102***b*. Additionally, the switch button may be held down for a longer period of time to indicate to the input device **104** to pair with another electronic device **102**.

The communication interface **110** may allow the input device **104** to send and receive data from the multiple electronic devices **102***a-b*. For example, the communication interface **110** may send user input data via the antenna **112**. In some configurations, the communication interface **110** may provide the input device **104** the ability to communicate using different technology interfaces. For example, the communication interface **110** may allow the input device **104** to communicate using Bluetooth, Wi-Fi, infrared, near-wave communications, etc.

In some configurations, the input device **104** may be able to retain the connection mode (e.g., active mode or standby mode) of the connection between the input device **104** and both the first electronic device **102***a* and the second electronic device **102***b* when switching between modes. When the input device **104** connects to the second electronic device **102***b*, the input device **104** may switch the connection status flag of the connection between the input device **104** and the first electronic device **102***a* (e.g., the first connection). For example, the input device **104** may switch and update the first connection status flag to standby, or standby mode.

Upon connecting with the second electronic device **102***b* and updating the first connection status flag, the input device **104** may actively communicate with the second electronic device **102***b*. Accordingly, the input device **104** may update the second connection status flag to active, or active mode. In some configurations, when the input device **104** establishes a new connection corresponding to a newly connected electronic device **102**, the connection status flag for the new connection may be switched to active while the connection status flag corresponding to previous connections may be updated to standby.

When the input device **104** is to be switched back to sending input data to the first electronic device **102***a*, the connection status flag corresponding to the connection with the second electronic device **102***b* (e.g., the second connection) may be updated to standby mode and the first connection status flag may be switched to active mode. If the first connection status flag indicates that the first connection is the active connection, then input data will be sent to the first electronic device **102***a*. In this manner, the input device **104** may be simultaneously connected to both the first electronic device **102***a* and the second electronic device **102***b* while maintaining the requirement of actively communicating with only one electronic device **102** at a time. Furthermore, the input device **104** may quickly and dynamically change between transmitting input data between the first electronic device **102***a* and the second electronic device **102***b*.

In some configurations, the input device **104** may switch between the first electronic device **102***a* and the second electronic device **102***b* when an input is selected. For example, a user may press a button or a key on a keyboard to switch the input of the keyboard from a laptop computer to a desktop computer. In this manner, the input device **104** may be able to maintain connections to multiple electronic devices **102** simultaneously while also being able to send input data to the desired electronic device **102**.

As an example, in the case of the input device **104** being a Bluetooth input device such as a Bluetooth mouse, the Bluetooth mouse may pair with multiple electronic devices **102**. The Bluetooth mouse may actively communicate with one electronic device **102**, while maintaining connections (e.g., standby connections) with the other electronic devices **102**. In other words, the Bluetooth mouse may actively communicate (e.g., send input data) with one electronic device **102**, while still being connected with multiple other electronic devices **102** in a standby mode until a switch is requested by a user.

Continuing the example of the Bluetooth mouse, when a request to change electronic devices **102** is made, the Blue-

tooth mouse may switch which electronic device **102** it communicates with. However, the Bluetooth mouse does not need to re-pair with the desired electronic device **102**. Rather, the Bluetooth mouse switches which electronic device **102** to send input data to. The Bluetooth mouse may choose to send input data to a previously connected electronic device **102** or may choose to connect with a new electronic device **102** and send input data to the newly connected electronic device **102**.

If a user requests to change which electronic device **102** to send input data to, the user selects the desired electronic device **102**, for example, by using a button that requests the switch. Once the user selects the desired electronic device **102** to send input data to, the input device **104** may update the connection status flag corresponding to the connection with the desired electronic device **102** to active. The input device **104** also updates the connection status flag corresponding to each connection with the other electronic device **102** to standby. Accordingly, a user may use the Bluetooth mouse to quickly switch between multiple electronic devices **102** while using a single Bluetooth mouse as the input device **104**.

FIG. **2** is a flow diagram illustrating one configuration of a method **200** for using an input device **104** simultaneously with multiple electronic devices **102***a-b*. The method **200** may be performed by an input device **104**, such as the input device **104** described in connection with FIG. **1**. In addition, input device **104** may be a Bluetooth input device, such as a Bluetooth mouse or a Bluetooth keyboard.

The input device **104** may establish **202** a first connection with a first electronic device **102***a*. The first connection may enter an active mode. In other words, a first connection status flag corresponding to the first connection may be flagged as active. Once actively connected, the input device **104** may send input data to the first electronic device **102***a* via the first connection.

The input device **104** may establish **204** a second connection with a second electronic device **102***b*. The second connection may enter the active mode. In other words, a second connection status flag corresponding to the second connection may be flagged as active upon the second electronic device **102***b* connecting with the input device.

The input device **104** may switch **206** the first connection to a standby mode in response to the second connection entering the active mode. Thus, when the second connection status flag is updated to active, the first connection status flag may update to standby mode. This may occur because the input device **104** may only be able to actively communicate with one electronic device **102** at a time. Thus, when the second connection enters the active mode, the first connection may be switched to a standby mode. In a similar fashion, when the second connection status flag is updated to active mode, all other connection status flags corresponding to other connections between the input device **104** and the other electronic devices **102** may be switched to standby mode.

When the input device **104** is actively connected to the second electronic device **102***b*, the input device **104** may actively communicate and send input data to the second electronic device **102***b* via the second connection.

In some configurations, when an additional connection is made, the oldest existing connection may be terminated and the corresponding connection status flag may be deleted. For example, if the input device **104** is connected to a maximum number of connections, then the process of adding another connection may require terminating an older connection to allow room for the new connection to be made. For instance, if the input device **104** can only maintain three connections simultaneously, one in an active mode and two in a standby mode, adding a fourth connection corresponding to a fourth electronic device (not shown) would require the input device **104** to remove one of the existing connections.

The input device **104** may remove the oldest existing connection. In one configuration, the oldest existing connection may be the connection that was established before any of the other existing connections. In another configuration, the oldest connection may be the connection that has been in standby mode the longest. In other words, the oldest connection is the connection that has been not used in the longest amount of time. It should be appreciated that other methods and approaches may be employed in selecting the connection to remove. For example, the user may be prompted as to which connection to remove.

The maximum number of connections allowed with the input device **104** may be configurable. In other words, a user may specify the number of devices to maintain before connections to older devices are removed or terminated. In this manner, a user may specify the number of devices that would need to be cycled through before the list of maintained connections would start repeating.

The input device **104** may switch **208** the first connection and the second connection between the active mode and the standby mode such that only one connection is in the active mode at a time. When the first connection is switched to the active mode, the second connection may be placed in the standby mode or may be disconnected. The input device **104** may again send user input data to the first electronic device **102***a* as if the first connection had always been actively connected. In other words, when the input device **104** puts the first connection in the standby mode, the first electronic device **102***a* may not know that the input device **104** is not sending input data to it. Rather, the first electronic device **102***a* may determine that no input data is being obtained by the input device **104**. In this case, the first electronic device **102***a* may still believe that it is the only electronic device **102** paired with the input device **104**. When the input device **104** switches the first connection back to the active mode, the first electronic device **102***a* may again receive input data from input device **104**.

When the input device **104** switches between the first electronic device **102***a* and the second electronic device **102***b*, or between any two electronic devices **102**, the input device **104** may buffer user input data until the switch is complete. For example, a user may switch a keyboard from sending input data from a laptop computer to a desktop computer by pushing a switching input button on the keyboard. After pushing the switching input button, and before the switch is completed, the user may begin to enter input data. The keyboard may buffer the user input until the connection between the keyboard and the desktop computer is reactivated. Once the connection is reactivated, the keyboard may send the buffered input data to the desktop computer.

FIG. **3** is a block diagram illustrating one configuration of a human interface device (HID) **304**. The HID **304** may be one example of the input device **104** described in connection with FIG. **1**. For example, the HID **304** may establish a first connection with a first electronic device **102***a*, a second connection with a second electronic device **102***b* and additional connections with other electronic devices (not shown).

The HID **304** may include a connection mode module **306**, an input module **308**, a communication interface **310**, an inactivity module **320** and an antenna **312**. The connection mode module **306** may assist the HID device **304** in establishing a connection and/or pairing with an electronic device **102**. The connection mode module **306** may include a connection status flag **326** that indicates an active connection **322** or a standby connection **324**.

The connection mode module **306** may monitor and maintain connection information corresponding to each of the multiple electronic devices **102**. For example, the connection mode module **306** may track which electronic device **102** is actively connected to the HID **304** and which electronic devices **102** are connected to the HID **304** in a standby mode.

The connection status flag **326** that is marked as the active connection **322** may indicate which electronic device **102** the HID **304** is actively connected to. Connection status flags **326** that are marked as the standby connection **324** may indicate which electronic devices **102** are connected to the HID **304** in the standby mode. For example, if the HID **304** is actively connected to the first electronic device **102***a* and subsequently, the HID **304** actively connects to the second electronic device **102***b*, the connection status flag **326** corresponding to the connection between the HID **304** and the first electronic device **102***a* may be updated to indicate a standby connection **324**.

If a switch between electronic devices **102** is requested, the connection status flag **326** corresponding to the connection of the electronic device **102** that was actively connected may be switched from indicating an active connection **322** to indicating a standby connection **324**. This may result when a connection status flag **326** corresponding to a connection that was previously marked as a standby connection **324** is switched to indicate that it is now the active connection **322**.

In some configurations, when a new electronic device **102** is connected, the connection status flag **326** corresponding to the connection of the new electronic device **102** may be marked as the active connection **322**. All previous connections may enter into the standby mode, if not already in the standby mode. In other words, the previously actively connected electronic device **102** that did have a connection status flag **326** indicating the active connection **322** will be updated to indicate that the previously actively connected electronic device **102** now has a standby connection **324**. Also, all other electronic devices **102** that had connection status flags **326** indicating a standby connection **324** will remain in the standby mode and their corresponding connection status flags **326** will indicate a standby connection **324**. If the maximum number of maintained connections has been reached, then one of the previous connections, such as the oldest existing connection, may be terminated to allow the new electronic device **102** to be connected.

The input module **308** may include input data **328**, a switching input **330** and a new connection input **332**. The input module **308** may obtain input, such as user input data **328**. For example, if the HID **304** is a keyboard, the input data **328** may include key strokes from a user. If the HID **304** is a mouse, the input data **328** may include user mouse movements.

The switching input **330** may be a key or a button on the HID **304** to indicate to the HID **304** to switch communications between electronic devices **102**. For example, if the switching input **330** is selected, the HID **304** may switch one of the standby connections **324** to the active connection **322** and may switch the previously actively connected electronic device **102** to a standby connection **324**.

The new connection input **332** may indicate to the HID **304** to establish a new connection between a new electronic device **102** and the HID **304**. In some configurations, the switching input **330** and the new connection input **332** may be the same key or button, for instance, on the HID **304**. For example, a user may short-press a button on the HID **304** to switch connections and long-press the same button to add a new electronic device **102**.

As another example, the switching input **330** and the new connection input **332** may be triggered by the same button. When a user has cycled through all the connections, the HID **304** may attempt to connect with an additional electronic device **102**. Adding an additional electronic device **102** may be canceled or skipped by again pushing the button to again cycle through the active connection **322** and the standby connections **324**.

The communication interface **310** may include a discoverable state module **334** and a paging state module **336**. The communication interface **310** may allow the HID **304** to send and receive data from the multiple electronic devices **102**. For example, the communication interface **310** may send user input data via the antenna **312**.

In some configurations, the communication interface **310** may provide the HID **304** the ability to communicate using different technology interfaces. For example, the communication interface **310** may allow the HID **304** to communicate using Bluetooth, Wi-Fi, infrared, near-wave communications, etc. For example, if the HID **304** is a Bluetooth device, the discoverable state module **334** and the paging state module **336** may assist the HID **304** in pairing with another Bluetooth-enabled electronic device **102**. Similarly, if the HID **304** is a Wi-Fi device, the discoverable state module **334** may assist the HID **304** in connecting with another Wi-Fi-enabled electronic device **102**.

The inactivity module **320** may monitor the current activity status between the HID **304** and the electronic device **102** to which the HID **304** is actively connected (e.g., the active connection **322**). The inactivity module **320** may include an activity status **338**, an inactivity timer **340**, a discoverable state timer **342**, a paging state timer **344** and a power down timer **346**.

The activity status **338** may indicate the connection status between the HID **304** and the electronic device **102** to which the HID **304** is actively connected. Even when the HID **304** is actively connected to an electronic device **102**, the HID **304** may enter into idle mode. For example, if the HID **304** is a Bluetooth mouse and a user has not moved the mouse for a specified amount of time (e.g., the inactivity timer **340** has expired), the Bluetooth mouse may enter into idle mode to conserve power. Then, when a user moves the Bluetooth mouse, the HID **304** changes back to the active mode to again actively communicate with the electronic device **102**. Additional information regarding active mode, idle mode and timeouts will be given in connection with FIG. **7** below.

The HID **304** may also use other timers. For example, when the HID **304** employs the discoverable state module **334** to connect with a new electronic device **102**, the discoverable state timer **342** may start. If the discoverable state timer **342** expires or times out before the HID **304** connects to a new electronic device **102**, the HID **304** may switch to a previously connected electronic device **102**. Similarly, if the paging state timer expires or times out when the HID **304** enters into a paging state, the HID **304** may switch to a previously connected electronic device **102** or stop attempting to page the electronic device **102** to which the HID **304** is actively connected.

In some configurations, if the HID **304** is in idle mode for a period of time, such as the duration of the power down timer **346**, then the HID **304** may power down to conserve power. This may occur when the power down timer **346** expires once in idle mode. The HID **304** may maintain the connection status of each connection (e.g., the connection status flag **326**) to which the HID **304** is connected so that connections with each of the electronic devices **102** may be reestablished once the HID **304** is powered back on.

FIG. **4** is a flow diagram illustrating a more detailed configuration of a method **400** for using an input device **104** simultaneously with multiple electronic devices **102**. The method **400** may be performed by an input device **104**, such as the input device **104** described in connection with FIG. **1**. Additionally, the method **400** may be performed by a human interface device (HID) **304**, such as the HID **304** described in connection with FIG. **3**. The input device **104** may be a Bluetooth input device, such as a Bluetooth mouse or a Bluetooth keyboard.

The input device **104** may establish **402** a first connection with a first electronic device **102***a*. The first connection may enter an active mode. In other words, a first connection status flag **326** corresponding to the first connection may be flagged as active (e.g., flagged as the active connection **322**). Once actively connected, the input device **104** may send input data **328** to the first electronic device **102***a* via the first connection.

The input device **104** may establish **404** a second connection with a second electronic device **102***b*. The second connection may enter the active mode. In other words, a second connection status flag **326** corresponding to the second connection may be flagged as active (e.g., flagged as the active connection **322**).

The input device **104** may switch **406** the first connection to a standby mode in response to the second connection entering the active mode. Thus, when the second connection status flag **326** is updated to active mode, the first connection status flag **326** may update to standby mode.

The input device **104** may establish **408** a third connection with a third electronic device (not shown). The third connection may enter the active mode. The input device **104** may switch **410** the second connection to a standby mode in response to the third connection entering the active mode. Thus, when the third connection enters into active mode, the second connection may join the first connection in standby mode. Accordingly, the input device **104** may actively communicate with the third electronic device while the first connection and the second connection have corresponding connection status flags **326** indicating that they are standby connections **324**.

The input device **104** may switch **412** the first connection, the second connection and the third connection between the active mode and the standby mode. When the first connection is selected to again be the active connection **322**, the second connection and the third connection may be switched to a standby mode and their corresponding connection status flags **326** may be updated to indicate a standby connection **324**. Similarly, when the second connection is selected to be the active connection **322**, the first connection and the third connection may switched to a standby mode and their corresponding flags may be updated to indicate a standby connection **324**.

In some configurations, the input device **104** may terminate **414** the third connection with the third electronic device (not shown). For instance, the input device **104** may determine that the third electronic device is powered down. If the third electronic device is powered down, the input device **104** may terminate **414** the connection between the input device **104** and the third electronic device.

Once the third connection is terminated, the input device **104** may switch **416** the first connection and the second connection between the active mode and the standby mode such that only one connection is the active mode at a time. If the first connection is the active connection **322**, the second connection is placed in the standby mode. Upon selecting the first connection to be the active connection **322**, the input device **104** may send user input data **328** to the first electronic device **102***a* as if the first connection had always been actively connected.

FIG. **5** is a diagram illustrating one configuration of a system in which one or more Bluetooth input devices may simultaneously connect with multiple electronic devices. FIG. **5** shows one example wireless communication system **500** in which a Bluetooth keyboard **504***a* and a Bluetooth mouse **504***b* may simultaneously connect with multiple electronic devices, such as a laptop **502***a*, a desktop **502***b*, a tablet **502***c*, etc.

The laptop **502***a*, the desktop **502***b* and the tablet **502***c* may each have a Bluetooth connection interface **514***a-c*, a display **516***a-c* and an antenna **518***a-c*, respectively. The Bluetooth connection interface **514** may allow the electronic devices **502** to pair and communicate with one or more of the input devices (e.g., the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b*).

The display **516** on the laptop **502***a*, the desktop **502***b* and the tablet **502***c* may display input data from the input devices. For example, the display **516** may be a liquid crystal display (LCD) or light-emitting diode (LED) monitor that displays mouse movements and keyboard strokes from the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b*.

The Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* may each include a connection mode module **506***a-b*, an input module **508***a-b*, a Bluetooth connection interface **510***a-b* and an antenna **512***a-b*, respectively. The connection mode module **506** may monitor and maintain connections between the multiple electronic devices **502***a-c*. The connection mode module **506** may also assist the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* in establishing and/or pairing connections with the laptop **502***a*, the desktop **502***b* and/or the tablet **502***c*.

The input module **508** may obtain input, such as user input data **328**, indicating to the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b* to switch communications between the laptop **502***a*, the desktop **502***b* and/or the tablet **502***c* or to pair with a new electronic device (not shown). For example, a user may select an input button on the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b* to switch input from the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b* between the laptop **502***a* and the desktop **502***b*.

In some configurations, the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* may be in communication with each other such that when a user selects a switching input button on the Bluetooth keyboard **504***a* (or Bluetooth mouse **504***b*), the input data from both the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* is switched from one electronic device **502** to another.

The Bluetooth connection interface **510** may allow the Bluetooth keyboard **504***a* or Bluetooth mouse **504***b* to send data to and receive data from the multiple electronic devices **502***a-c* via the Bluetooth interface. For example, the Bluetooth communication interface **510** may allow the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b* to send user input data via the antennas **512***a-b*, respectively. The multiple electronic devices **502***a-c* may receive the input data **328** via their respective antennas **518***a-c*.

The Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* may pair with the laptop **502***a*, the desktop **502***b* and/or the tablet **502***c*. While the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* may pair with the multiple electronic devices **502***a-c* simultaneously, the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* may only actively communicate with one electronic device **502** at a time. If the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b* are actively

communicating with and sending input data to the desktop **502***b*, then the connection modes of the laptop **502***a* and the tablet **502***c* are paused in a standby mode. If the switch selection input (e.g., switching input **330**) is triggered, then the Bluetooth keyboard **504***a* and/or the Bluetooth mouse **504***b* may switch to be actively connected to the laptop **502***a*, the tablet **502***c* or another electronic device (not shown). In this manner, a user may cycle through different electronic devices **502***a-c* and select which electronic device **502** to actively communicate with via the Bluetooth keyboard **504***a* and the Bluetooth mouse **504***b*.

FIG. **6** is a flow diagram illustrating a more detailed configuration of a method **600** for using an input device simultaneously with multiple electronic devices **102**. The method **600** may be performed by an input device **104**, such as the input device described in connection with FIG. **1**. Additionally, the method **600** may be performed by a human interface device (HID) **304**, such as the HID **304** described in connection with FIG. **3**. The input device **104** may be a Bluetooth input device, such as a Bluetooth mouse or a Bluetooth keyboard.

The input device **104** may power on **602**. This may occur if the input device was previously in a powered-down mode. In some configurations, when the input device is powered on **602**, the input device **104** may not be connected to any electronic devices **102**. Further, the input device **104** may not have any information corresponding to any connections stored in memory. In other configurations, when the input device is powered on **602**, the input device **104** may have information corresponding to previous connections stored in memory. For example, the input device **104** may have information corresponding to a connection with a first electronic device **102***a* stored in memory. Furthermore, the input device **104** may also have stored in memory that the connection status flag **326** corresponding to the first connection with the first electronic device **102***a* may indicate that the first connection is an active connection **322**.

Once powered on **602**, the input device **104** may connect **604** with an electronic device **102**, such as the first electronic device **102***a*. For example, if the input device **104** is a Bluetooth input device, it may pair with a first electronic device **102***a*. The input device **104** may then actively communicate with the first electronic device **102***a*. The input device **104** may also update the first connection status flag **326** to indicate that the first connection is the active connection **322**.

The input device **104** may send **606** input data **328** to the connected electronic device **102**. In this case, the input device **104** may send input data **328** to the first electronic device **102***a*. Input data **328** may include mouse movements, key strokes, button selections, voice commands, user selections, etc.

The input device **104** may determine **608** whether to connect with another electronic device **102**, such as a second electronic device **102***b*. If the input device **104** determines to connect with another electronic device **102**, such as the second electronic device **102***b*, then the input device **104** may connect **610** with the other electronic device **102**. For example, in the case of the input device **104** being a Bluetooth input device, the input device **104** may pair with the second electronic device **102***b*. By pairing with the second electronic device **102***b*, the input device **104** establishes an active connection **322** between the input device **104** and the second electronic device **102***b*. Upon establishing an active connection **322** with the second electronic device **102***b*, the input device **104** may update the first connection status flag **326** to indicate a standby connection **324**.

The input device **104** may determine **612** whether there is a maximum number of electronic device connections. If there is a maximum number of connections, the input device **104** may terminate **614** an existing connection. For example, if the input device **104** has a maximum number of connections, then adding another connection may require an older connection to be terminated **614** to allow room for the new connection. In some configurations, the maximum number of electronic devices **102** that can pair may depend on a standard, such as the Bluetooth standard.

The input device **104** may terminate **614** an existing connection by removing the oldest existing connection. In one configuration, the oldest existing connection may be the connection that was established before any of the other existing connections. In another configuration, the oldest connection may be the connection that has been in standby mode the longest. In still another configuration, the input device **104** may terminate **614** the connection that has been used the least (e.g., the connection with the least amount of time as the active connection **322**).

If there is not a maximum number of connections, then the input device **104** may switch **616** the previous active connection to a standby mode. For example, if the input device **104** is actively connected to the first electronic device **102***a* and subsequently becomes actively connected to the second electronic device **102***b*, then the first connection may be put in a standby mode and may be marked as a standby connection **324** (e.g., the connection status flag **326** corresponding to the second connection between the input device **104** and the second electronic device **102***b* may be marked as a standby connection **324**).

After the previous active connection is switched **616** to the standby mode or if the input device **104** does not determine **608** to connect with another electronic device **102**, then the input device **104** may determine **618** whether to switch to a previous connection. If the input device **104** does not switch to a previous connection, such as one of the connections marked as a standby connection **324**, then the input device **104** may send **606** input data **328** to the currently connected electronic device **102** (e.g., the electronic device **102** marked as the active connection **322**).

If the input device **104** does switch to a previous connection (e.g., one of the connections marked as a standby connections **324**), then the input device **104** may select **620** a previous connection to become the active connection **322**. For example, a user may desire to select **620** the first connection between the input device **104** and the first electronic device **102***a*. The user may indicate a selection change by employing a switching input **330**, such as a key or a button on the input device **104**. In this case, the input device **104** may switch **622** the selected connection to the active mode. The selected connection may then be marked as the active connection **322**. The input device **104** may then switch **616** all other connections, including the connection that was previously active, to the standby mode and may update their corresponding connection status flags **326** to indicate that they are now standby connections **324**.

The method **600** may continually cycle as additional electronic devices are added, active connections **322** are selected, and standby connections **324** are updated. For example, the input device **104** may establish a connection with a third electronic device (not shown).

As another example, a Bluetooth mouse **504***b* may cycle through and select **620** a previous connection to become the active connection **322** from among a laptop **502***a*, a desktop **502***b* and a tablet **502***c*, as described in connection with FIG. **5**. In this manner, the input device **104** may quickly and

dynamically switch from sending input data **328** between the multiple electronic devices **502** without re-establishing a new connection each time the input device **104** switches between electronic devices **502**.

FIG. **7** is a state diagram illustrating transitions on a human interface device (HID) **304**. The human interface device **304** may be an input device **104** as described in connection with FIG. **1**. Additionally, the human interface device **304** may be the HID **304** described in connection with FIG. **3**. As referred to in FIG. **7**, the HID **304** is a Bluetooth input device, such as a Bluetooth keyboard **504***a* or a Bluetooth mouse **504***b*.

The HID **304** may be in a powered down state **752**. In some instances, when the HID **304** powers on, there may be information corresponding to one or more previous connections with electronic devices stored in memory on the HID **304**. However, in some cases, when the HID **304** powers on, there may be no information corresponding to any previous connections with electronic devices stored in memory.

If the HID **304** powers on **702** and there is information corresponding to one or more previous connections with electronic devices stored in memory on the HID **304**, the HID **304** may enter into a discoverable state **754**. If the HID **304** powers on **704** and there is no information corresponding to any previous connections with electronic devices stored in memory, the HID **304** may enter into a paging state **756**.

In the discoverable state **754**, the HID **304** may discover one or more electronic devices **102** to pair with. For example, the HID **304** may employ the discoverable state module **334** to communicate with electronic devices **102** that the HID **304** may connect with. In the discoverable state **754**, the HID **304** may successfully pair **706** with an electronic device, such as a first electronic device **102***a*. Once paired with an electronic device **102**, the HID **304** may enter into the paging state **756**.

If the HID **304** powers on **702** and there is no information corresponding to one or more previous connections with electronic devices stored in memory on the HID **304**, the HID **304** may enter into a discoverable state **754**. If the HID **304** powers on **704** and there is information corresponding to any previous connections with electronic devices stored in memory, the HID **304** may enter into a paging state **756**.

In the paging state **756**, the HID **304** may attempt to connect with an electronic device **102** that it has previously been paired with. Information regarding the connections may be stored in memory. For example, the HID **304** may have stored in memory that a connection with a second electronic device **102***b* was the last active connection with the HID **304**. The HID **304** may employ a paging state module **336** to page one or more electronic devices **102**.

If the HID **304** successfully pages **710** a previously connected electronic device **102**, then the HID **304** may enter an active state **758** with the previously connected electronic device **102**. If the HID **304** fails **712** to page the previously connected electronic device **102**, then the HID **304** may enter the idle state **760**. Paging may fail **712** if the HID **304** is not able to connect with the selected electronic device **102**. For example, if the HID **304** does not connect with the previously connected electronic device **102** before the paging state timer **344** expires, then the HID **304** may enter the idle state **760**.

In the active state **758**, the HID **304** may actively communicate with the selected electronic device **102** (e.g., the electronic device **102** with the active connection **322**). In this manner, the HID **304** may send input data **328** to the actively connected electronic device **102**. For example, if the HID **304** is actively connected to the first electronic device **102***a*, then input data **328** is sent to the first electronic device **102***a*.

After a period of time, the HID **304** may enter the idle state **760**. For example, once activity on the HID **304** stops, such as user input, the HID **304** may initiate an inactivity timer **340**. If the inactivity timer **340** expires or times out, then the HID **304** may enter the idle state **760**. An activity status **338** on the HID **304** may track if the HID **304** is in the active state **758** or the idle state **760**.

In the idle state **760**, the HID **304** may reduce transmissions and power to conserve power and extend battery life. It should be appreciated that there may be many levels of granularity of power consumption within the idle state **760**. In other words, in some configurations, the idle state **760** may refer to a low power mode where the HID **304** consumes power below the amount of power consumed in the active state **758**. While in the idle state **760**, the HID **304** may detect **716** activity, such as user input data **328**. If the HID **304** detects **716** activity, the HID **304** may re-enter the active state **758**.

If the HID **304** is in the idle state **760** and the HID **304** detects a command (e.g., from the new connection input **332**) to connect **718** to an additional electronic device **102**, such as a second electronic device **102***b*, the HID **304** may enter into the discoverable state **754**. Then, the HID **304** may continue to the paging state **756** and connect with the second electronic device **102***b*, or the HID **304** may return to the idle state **760** if the HID **304** fails to pair or connect with the second electronic device **102***b*.

If the HID **304** is in the idle state **760** for more than a specified period of time (e.g., the power down timer **346** times out), then the HID **304** may enter the power down state **752**. Additionally, the HID **304** may be manually powered down **720**. The HID **304** may power down **720** to conserve power and extend battery life.

When entering the power down state **752**, the HID **304** may store information corresponding to previous connections with electronic devices **102** in memory so that the HID **304** may quickly connect with a previously connected electronic device **102** when the HID **304** again powers on.

As an example, the HID **304** may be actively connected to the second electronic device **102***b*. The HID **304** may also be connected to the first electronic device **102***a* in a standby state. If the HID **304** powers down, information corresponding to the connection with the second electronic device **102***b* may be stored in memory. For example, the HID **304** may store in memory that the second electronic device **102***b* was the last electronic device **102** to be in the active state. The HID **304** may also store in memory information regarding the first electronic device **102***a* being connected in the standby state.

Once the HID **304** is powered on **704**, the HID **304** may determine that there is information regarding previous connections stored in memory and that the second electronic device **102***b* should be connected as the active connection **322**. Thus, the HID **304** may skip the discoverable state **754** and enter directly into the paging state **756** with the second electronic device **102***b*. The HID **304** may then enter the paging state **756** and successfully page **710** the second electronic device **102***b* to enter the active state **758** with the second electronic device **102***b*. The HID **304** may then send input data **328** to the second electronic device **102***b*. This cycle may be repeated.

FIG. **8** illustrates various components that may be utilized in an input device **804**. The illustrated components may be located within the same physical structure or in separate housings or structures. The input device **804** may be configured similar to the one or more input devices **104**, **304**, **504***a*, **504***b*, described previously. The input device **804** includes a processor **890**. The processor **890** may be a general purpose single- or multi-chip microprocessor (e.g., an ARM), a special purpose microprocessor (e.g., a digital signal processor (DSP)), a microcontroller, a programmable gate array, etc.

The processor **890** may be referred to as a central processing unit (CPU). Although just a single processor **890** is shown in the input device **804** of FIG. **8**, in an alternative configuration, a combination of processors (e.g., an ARM and DSP) could be used.

The input device **804** may also include memory **866** in electronic communication with the processor **890**. That is, the processor **890** can read information from and/or write information to the memory **866**. The memory **866** may be any electronic component capable of storing electronic information. The memory **866** may be random access memory (RAM), read-only memory (ROM), magnetic disk storage media, optical storage media, flash memory devices in RAM, on-board memory included with the processor, programmable read-only memory (PROM), erasable programmable read-only memory (EPROM), electrically erasable PROM (EEPROM), registers, and so forth, including combinations thereof.

Data **870***a* and instructions **868***a* may be stored in the memory **866**. The instructions **868***a* may include one or more programs, routines, sub-routines, functions, procedures, etc. The instructions **868***a* may include a single computer-readable statement or many computer-readable statements. The instructions **868***a* may be executable by the processor **890** to implement one or more of the methods **300**, **400** described above. Executing the instructions **868***a* may involve the use of the data **870***a* that is stored in the memory **866**. FIG. **8** shows some instructions **868***b* and data **870***b* being loaded into the processor **890** (which may come from instructions **868***a* and data **870***a*).

The input device **804** may also include one or more communication interfaces **872** for communicating with other electronic devices. The communication interfaces **872** may be based on wired communication technology, wireless communication technology, or both. Examples of different types of communication interfaces **872** include a serial port, a parallel port, a Universal Serial Bus (USB), an Ethernet adapter, an IEEE 1394 bus interface, a small computer system interface (SCSI) bus interface, an infrared (IR) communication port, a Bluetooth wireless communication adapter, an IEEE 802.11 wireless communication adapter and so forth.

The input device **804** may also include one or more output devices **876**. Examples of different kinds of output devices **876** include a speaker, printer, etc. One specific type of output device that may be typically included in an input device **804** is a display device **878**. Display devices **878** used with configurations disclosed herein may utilize any suitable image projection technology, such as a cathode ray tube (CRT), liquid crystal display (LCD), light-emitting diode (LED), gas plasma, electroluminescence, or the like. A display controller **880** may also be provided for converting data stored in the memory **866** into text, graphics, and/or moving images (as appropriate) shown on the display device **878**.

The various components of the input device **804** may be coupled together by one or more buses, which may include a power bus, a control signal bus, a status signal bus, a data bus, etc. For simplicity, the various buses are illustrated in FIG. **8** as a bus system **882**. It should be noted that FIG. **8** illustrates only one possible configuration of an input device **804**. Various other architectures and components may be utilized.

Unless indicated otherwise, any disclosure of an operation of an apparatus having a particular feature is also expressly intended to disclose a method having an analogous feature (and vice versa), and any disclosure of an operation of an apparatus according to a particular configuration is also expressly intended to disclose a method according to an analogous configuration (and vice versa). The term "configuration" may be used in reference to a method, apparatus or system as indicated by its particular context. The terms "method," "process," "procedure," and "technique" are used generically and interchangeably unless otherwise indicated by the particular context. The terms "apparatus" and "device" are also used generically and interchangeably unless otherwise indicated by the particular context. The terms "element" and "module" are typically used to indicate a portion of a greater configuration. Any incorporation by reference of a portion of a document shall also be understood to incorporate definitions of terms or variables that are referenced within the portion, where such definitions appear elsewhere in the document, as well as any figures referenced in the incorporated portion.

The term "determining" encompasses a wide variety of actions and, therefore, "determining" can include calculating, computing, processing, deriving, investigating, looking up (e.g., looking up in a table, a database or another data structure), ascertaining and the like. Also, "determining" can include receiving (e.g., receiving information), accessing (e.g., accessing data in a memory) and the like. Also, "determining" can include resolving, selecting, choosing, establishing and the like.

The phrase "based on" does not mean "based only on," unless expressly specified otherwise. In other words, the phrase "based on" describes both "based only on" and "based at least on."

The term "processor" should be interpreted broadly to encompass a general purpose processor, a central processing unit (CPU), a microprocessor, a digital signal processor (DSP), a controller, a microcontroller, a state machine, and so forth. Under some circumstances, a "processor" may refer to an application specific integrated circuit (ASIC), a programmable logic device (PLD), a field programmable gate array (FPGA), etc. The term "processor" may refer to a combination of processing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

The term "memory" should be interpreted broadly to encompass any electronic component capable of storing electronic information. The term memory may refer to various types of processor-readable media such as random access memory (RAM), read-only memory (ROM), non-volatile random access memory (NVRAM), programmable read-only memory (PROM), erasable programmable read-only memory (EPROM), electrically erasable PROM (EEPROM), flash memory, magnetic or optical data storage, registers, etc. Memory is said to be in electronic communication with a processor if the processor can read information from and/or write information to the memory. Memory that is integral to a processor is in electronic communication with the processor.

The terms "instructions" and "code" should be interpreted broadly to include any type of computer-readable statement(s). For example, the terms "instructions" and "code" may refer to one or more programs, routines, sub-routines, functions, procedures, etc. "Instructions" and "code" may comprise a single computer-readable statement or many computer-readable statements.

The functions described herein may be implemented in software or firmware being executed by hardware. The functions may be stored as one or more instructions on a computer-readable medium. The terms "computer-readable medium" or "computer-program product" refers to any non-transitory tangible storage medium that can be accessed by a computer or a processor. By way of example, and not limitation, a computer-readable medium may comprise RAM,

ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium that can be used to carry or store desired program code in the form of instructions or data structures and that can be accessed by a computer. Disk and disc, as used herein, includes compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk and Blu-ray® disc where disks usually reproduce data magnetically, while discs reproduce data optically with lasers.

The methods disclosed herein comprise one or more steps or actions for achieving the described method. The method steps and/or actions may be interchanged with one another without departing from the scope of the claims. In other words, unless a specific order of steps or actions is required for proper operation of the method that is being described, the order and/or use of specific steps and/or actions may be modified without departing from the scope of the claims.

Further, it should be appreciated that modules and/or other appropriate means for performing the methods and techniques described herein, such as those illustrated by FIG. **2**, FIG. **4** and FIG. **7**, can be downloaded and/or otherwise obtained by a device. For example, a device may be coupled to a server to facilitate the transfer of means for performing the methods described herein. Alternatively, various methods described herein can be provided via a storage means (e.g., random access memory (RAM), read-only memory (ROM), a physical storage medium such as a compact disc (CD) or floppy disk, etc.), such that a device may obtain the various methods upon coupling or providing the storage means to the device.

It is to be understood that the claims are not limited to the precise configuration and components illustrated above. Various modifications, changes and variations may be made in the arrangement, operation and details of the systems, methods, and apparatus described herein without departing from the scope of the claims.

What is claimed is:

1. A method for using an input device simultaneously with multiple electronic devices, comprising:

establishing a first connection with a first electronic device, wherein the first connection enters an active mode;

establishing a second connection with a second electronic device, wherein the second connection enters the active mode;

switching the first connection to a standby mode in response to the second connection entering the active mode;

switching the first connection and the second connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time;

storing connection mode information corresponding to the first connection and connection mode information corresponding to the second connection when the input device transitions to a power down state; and

restoring the connection mode of the first connection using the connection mode information corresponding to the first connection and the connection mode of the second connection using the connection mode information corresponding to the second connection when the input device transitions from the power down state to a paging state.

2. The method of claim **1**, wherein the input device sends input data to the electronic device that is connected in the active mode.

3. The method of claim **1**, wherein the input device is a Bluetooth input device.

4. The method of claim **1**, wherein switching the first connection and the second connection between the active mode and the standby mode is triggered by selecting a single input on the input device.

5. The method of claim **1**, further comprising:

establishing a third connection with a third electronic device, wherein the third connection enters the active mode;

switching the first connection and the second connection to the standby mode in response to the third connection entering the active mode; and

switching the first connection, the second connection, and the third connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time.

6. The method of claim **5**, wherein switching the first connection, the second connection, and the third connection between the active mode and the standby mode is triggered by selecting a single input on the input device, wherein repeatedly selecting the single input cycles the input device through the first connection, the second connection, and the third connection.

7. The method of claim **1**, further comprising:

establishing a maximum number of connections; and one of:

terminating an oldest connection when an additional connection is added; and

terminating the connection that has not been in the active mode for a longest amount of time when an additional connection is added.

8. The method of claim **1**, further comprising storing a first connection status flag corresponding to the first connection and a second connection status flag corresponding to the second connection, wherein each connection status flag indicates if the corresponding connection is in the active mode or the standby mode.

9. The method of claim **8**, further comprising updating each connection status flag upon switching the first connection and the second connection between the active mode and the standby mode.

10. The method of claim **1**, further comprising:

buffering input data obtained on the input device while the first connection and the second connection switch between the active mode and the standby mode; and

transmitting the buffered input data after the switch is completed.

11. The method of claim **1**, further comprising transitioning from a power down state to a discoverable state when no connection mode information is stored on the input device.

12. The method of claim **1**, further comprising transitioning from a discoverable state to a paging state when the input device successfully pairs with the electronic device that is trying to enter into the active mode with the input device, wherein the input device is a human interface device input device.

13. The method of claim **1**, further comprising transitioning from a discoverable state to an idle state when a discoverable state timer expires.

14. The method of claim **1**, further comprising transitioning from a discoverable state to an idle state when a pairing failure occurs with the electronic device that is trying to enter into the active mode with the input device, wherein the input device is a human interface device input device.

15. The method of claim **1**, further comprising transitioning from a paging state to an idle state when one of a paging failure and a paging mode timeout occurs with the electronic

device that is trying to enter into the active mode with the input device, wherein the input device is a human interface device input device.

16. The method of claim **1**, further comprising transitioning to an active state when input data is detected.

17. The method of claim **16**, further comprising transitioning from the active state to a discoverable state when an input on the input device is selected.

18. The method of claim **16**, wherein the first electronic device is in the active mode, and further comprising transitioning the first electronic device from an idle state to a power down state when the first electronic device is powered down.

19. The method of claim **18**, further comprising automatically switching the second connection from the standby mode to the active mode when the first electronic device is powered down.

20. The method of claim **1**, further comprising:

maintaining the first connection with the first electronic device in the standby mode, wherein the input device does not send input data to the first electronic device; and

maintaining the second connection with the second electronic device in the active mode, wherein the input device sends input data to the second electronic device.

21. An input device configured to simultaneously communicate with multiple electronic devices, comprising:

a processor;

memory in electronic communication with the processor;

instructions stored in the memory, the instructions being executable to:

establish a first connection with a first electronic device, wherein the first connection enters an active mode;

establish a second connection with a second electronic device, wherein the second connection enters the active mode;

switch the first connection to a standby mode in response to the second connection entering the active mode;

switch the first connection and the second connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time;

store connection mode information corresponding to the first connection and connection mode information corresponding to the second connection when the input device transitions to a power down state; and

restore the connection mode of the first connection using the connection mode information corresponding to the first connection and the connection mode of the second connection using the connection mode information corresponding to the second connection when the input device transitions from the power down state to a paging state.

22. The input device of claim **21**, wherein the input device sends input data to the electronic device that is connected in the active mode.

23. The input device of claim **21**, further comprising instructions being executable to:

establish a third connection with a third electronic device, wherein the third connection enters the active mode;

switch the first connection and the second connection to the standby mode in response to the third connection entering the active mode; and

switch the first connection, the second connection, and the third connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time.

24. The input device of claim **23**, wherein switching the first connection, the second connection, and the third connection between the active mode and the standby mode is triggered by selecting a single input on the input device, wherein repeatedly selecting the single input cycles the input device through the first connection, the second connection, and the third connection.

25. The input device of claim **21**, further comprising instructions being executable to store a first connection status flag corresponding to the first connection and a second connection status flag corresponding to the second connection, wherein each connection status flag indicates if the corresponding connection is in the active mode or the standby mode.

26. The input device of claim **21**, further comprising instructions being executable to transition from a power down state to a discoverable state when no connection mode information is stored on the input device.

27. The input device of claim **21**, further comprising instructions being executable to transition from a discoverable state to an idle state when a discoverable state timer expires.

28. The input device of claim **21**, further comprising instructions being executable to transition from a paging state to an idle state when one of a paging failure and a paging mode timeout occurs with the electronic device that is connected in the active mode.

29. The input device of claim **21**, further comprising instructions being executable to:

maintain the first connection with the first electronic device in the standby mode, wherein the input device does not send input data to the first electronic device; and

maintain the second connection with the second electronic device in the active mode, wherein the input device sends input data to the second electronic device.

30. A non-transitory tangible computer-readable medium having instructions thereon, the instructions comprising:

code for causing the input device to establish a first connection with a first electronic device, wherein the first connection enters an active mode;

code for causing the input device to establish a second connection with a second electronic device, wherein the second connection enters the active mode;

code for causing the input device to switch the first connection to a standby mode in response to the second connection entering the active mode;

code for causing the input device to switch the first connection and the second connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time;

code for causing the input device to store connection mode information corresponding to the first connection and connection mode information corresponding to the second connection when the input device transitions to a power down state; and

code for causing the input device to restore the connection mode of the first connection using the connection mode information corresponding to the first connection and the connection mode of the second connection using the connection mode information corresponding to the second connection when the input device transitions from the power down state to a paging state.

31. The non-transitory tangible computer-readable medium of claim **30**, wherein the input device sends input data to the electronic device that is connected in the active mode.

32. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to:

establish a third connection with a third electronic device, wherein the third connection enters the active mode;

switch the first connection and the second connection to the standby mode in response to the third connection entering the active mode; and

switch the first connection, the second connection, and the third connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time.

33. The non-transitory tangible computer-readable medium of claim **32**, wherein switching the first connection, the second connection, and the third connection between the active mode and the standby mode is triggered by selecting a single input on the input device, wherein repeatedly selecting the single input cycles the input device through the first connection, the second connection, and the third connection.

34. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to store a first connection status flag corresponding to the first connection and a second connection status flag corresponding to the second connection, wherein each connection status flag indicates if the corresponding connection is in the active mode or the standby mode.

35. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to transition from a power down state to a discoverable state when no connection mode information is stored on the input device.

36. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to transition from a discoverable state to an idle state when a discoverable state timer expires.

37. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to transition from a paging state to an idle state when one of a paging failure and a paging mode timeout occurs with the electronic device that is connected in the active mode.

38. The non-transitory tangible computer-readable medium of claim **30**, further comprising code for causing the input device to:

maintain the first connection with the first electronic device in the standby mode, wherein the input device does not send input data to the first electronic device; and

maintain the second connection with the second electronic device in the active mode, wherein the input device sends input data to the second electronic device.

39. An apparatus for simultaneously communicating with multiple electronic devices, further comprising:

means for establishing a first connection with a first electronic device, wherein the first connection enters an active mode;

means for establishing a second connection with a second electronic device, wherein the second connection enters the active mode;

means for switching the first connection to a standby mode in response to the second connection entering the active mode;

means for switching the first connection and the second connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time;

means for storing connection mode information corresponding to the first connection and connection mode information corresponding to the second connection when the input device transitions to a power down state; and

means for restoring the connection mode of the first connection using the connection mode information corresponding to the first connection and restoring the connection mode of the second connection using the connection mode information corresponding to the second connection when the input device transitions from the power down state to a paging state.

40. The apparatus of claim **39**, wherein the apparatus sends input data to the electronic device that is connected in the active mode.

41. The apparatus of claim **39**, further comprising:

means for establishing a third connection with a third electronic device, wherein the third connection enters the active mode;

means for switching the first connection and the second connection to the standby mode in response to the third connection entering the active mode; and

means for switching the first connection, the second connection, and the third connection between the active mode and the standby mode, wherein only one connection is in the active mode at a time.

42. The apparatus of claim **41**, wherein means for switching the first connection, the second connection, and the third connection between the active mode and the standby mode is triggered by selecting a single input on the apparatus, wherein repeatedly selecting the single input cycles the apparatus through the first connection, the second connection, and the third connection.

43. The apparatus of claim **39**, further comprising means for storing a first connection status flag corresponding to the first connection and a second connection status flag corresponding to the second connection, wherein each connection status flag indicates if the corresponding connection is in the active mode or the standby mode.

44. The apparatus of claim **39**, further comprising means for transitioning from a power down state to a discoverable state when no connection mode information is stored on the apparatus.

45. The apparatus of claim **39**, further comprising means for transitioning from a discoverable state to an idle state when a discoverable state timer expires.

46. The apparatus of claim **39**, further comprising means for transitioning from a paging state to an idle state when one of a paging failure and a paging mode timeout occurs with the electronic device that is connected in the active mode.

47. The apparatus of claim **39**, further comprising:

means for maintaining the first connection with the first electronic device in the standby mode, wherein the apparatus does not send input data to the first electronic device; and

means for maintaining the second connection with the second electronic device in the active mode, wherein the apparatus sends input data to the second electronic device.

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